

## Additional data on the terrestrial molluscs of the Kruger National Park

by

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### SYNOPSIS

*Apera bruggeni* Forc., *A. watsoni* Forc., *Limax valentianus* Fér., *Curvella amicitiae* n.sp. (fig.), *Archachatina livingstonei* (M. & P.) (fig. genital anatomy), *Archachatina transvaalensis* (Smith) and *Streptostele herma* Conn. are added to the list of terrestrial molluscs of the Kruger National Park, while *Archachatina subcylindrica* (Prest.) and *Streptostele meridionalis* vBr. have to be deleted, being synonyms of *A. transvaalensis* (Smith) and *S. herma* Conn. respectively. The total now stands at 53 species, viz., tropical elements 31 = 58%, transitional 18 = 34%, Cape 2 = 4% and anthropochorous 2 = 4%.

Recently Dr. L. Forcart of the Naturhistorisches Museum, Basle, Switzerland, undertook a revision of the indigenous slugs of Southern Africa, mainly based on material belonging to the Natal Museum (Forcart, 1967). In the present author's comprehensive survey of the terrestrial molluscs of the Kruger National Park (Transvaal) only some preliminary data on slugs of the families Veronicellidae, Urocyclidae and Aperidae were supplied (Van Bruggen, 1966: 390). It is now possible to give complete data for all Kruger National Park slugs studied by Dr. Forcart.

Continued studies on critical material have also yielded new results worth publishing. A further new species of Subulinidae has come to light and an achatinid new to the list has now been identified, while two names have to be replaced because of synonymy (see below). The following species have to be officially added to the list: *Apera bruggeni* Forc., *A. watsoni* Forc., *Limax valentianus* Fér., *Curvella amicitiae* n.sp., *Archachatina livingstonei* (M. & P.), *A. transvaalensis* (Smith) and *Streptostele herma* Conn. This brings the total of land molluscs in the Kruger National Park to 53 species; the two *Apera* had already been included, *Archachatina transvaalensis* (Smith) takes the place of *A. subcylindrica* (Prest.) and *Streptostele herma* Conn. takes the place of *S. meridionalis* vBr. This does not alter the zoogeographical picture to any appreciable degree. The position is now as follows:

|                  |                    |   |
|------------------|--------------------|---|
| Total 53 species | . . . tropical     | 31 = 58% ( <i>Curvella amicitiae</i> added),        |
|                  | . . . transitional | 18 = 34% ( <i>Archachatina livingstonei</i> added), |
|                  | . . . Cape         | 2 = 4% (no additions),                              |
|                  | anthropochorous    | 2 = 4% ( <i>Limax valentianus</i> added).           |

Strictly speaking both *Apera* species should be considered tropical too, but the family Aperidae as a whole represents a typical Cape element, so it has been deemed advisable to list them as such.

Furthermore some additional early Kruger National Park specimens have been traced in various collections. For generalities the student is referred to the author's previous paper (Van Bruggen, *op. cit.*). Abbreviations used are K.N.P. for Kruger National Park,  $l/d$  for the ratio length|major diameter of shells, and NM for Natal Museum.

The author wishes to tender his best thanks to Dr. Forcart for undertaking the study of the above families. Studies by the writer at the British Museum (Natural History), London, in April, 1967, were made possible by a grant from the Bolk-Fonds of the Koninklijke Nederlandse Akademie van Wetenschappen (Bolk Fund of the Royal Academy of Sciences). Acknowledgements are also due to the South African Council for Scientific and Industrial Research (C.S.I.R.) for various grants. The material has been deposited in the Natal Museum, Pietermaritzburg; a duplicate collection is kept by the Biologist at Skukuza, Kruger National Park, while a few specimens have been retained by Dr. Forcart for the Naturhistorisches Museum, Basle.

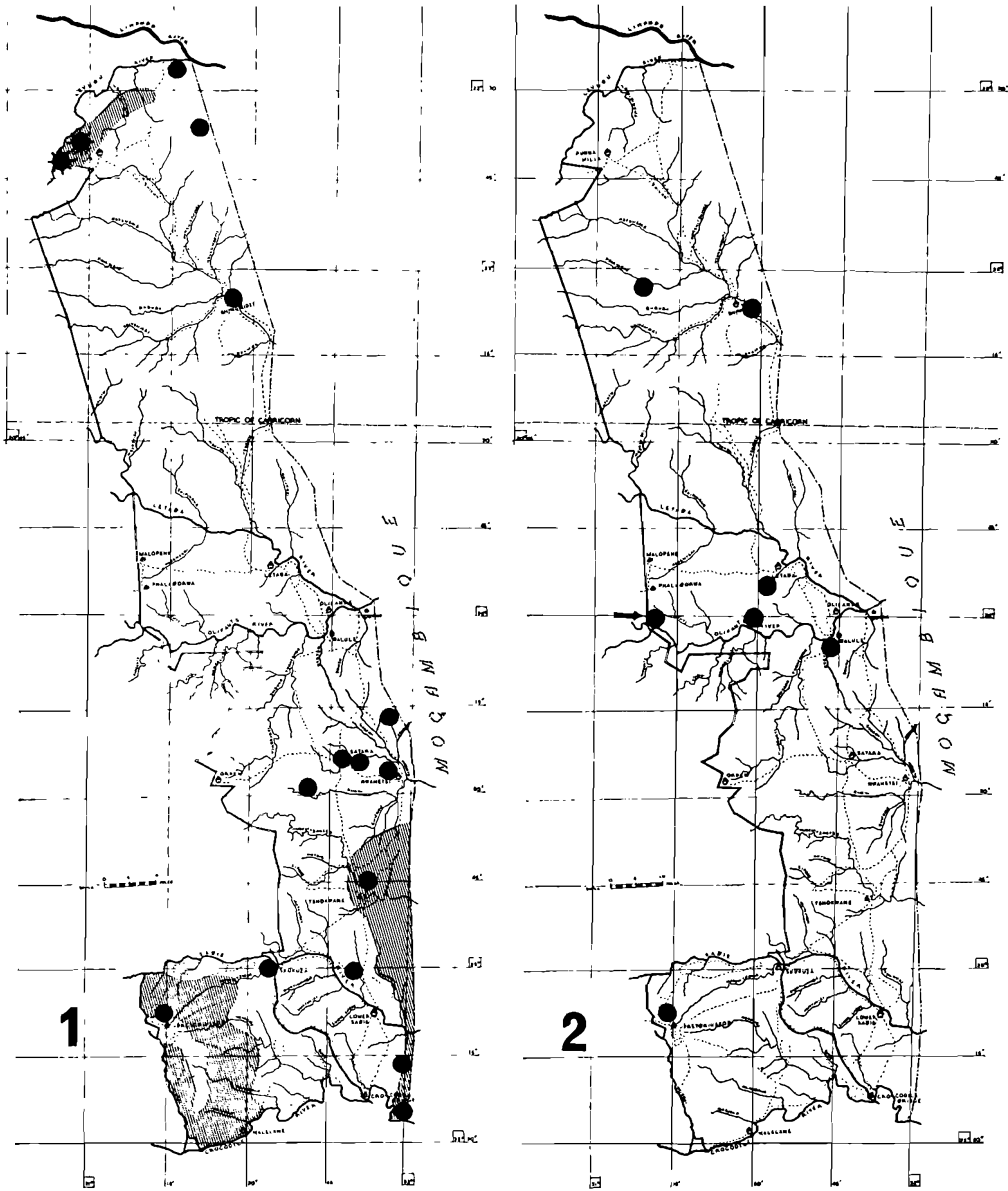
### Gastropoda Pulmonata

#### Family VERONICELLIDAE

##### *Laevicaulis natalensis natalensis* (Krauss, 1848), fig. 1

- Vaginulus natalensis* Krauss, *Südafr. Moll.* p. 72, 1848 (type locality: "Natal").  
*Veronicella natalensis*; Connolly, *Trans. R. Soc. S. Afr.* 12, p. 187, 1925; Connolly, *Ann. S. Afr. Mus.* 33, p. 450, 1939.  
*Vaginula natalensis*; Germain, *Mem. Estud. Mus. zool. Univ. Coimbra* (1) 80, p. 49, 1935.  
*Laevicaulis n. natalensis*; Forcart, *Ann. Mus. R. Congo Belg. (8°) Zool.* 23, p. 68, pl. 4, fig. 8, map 8, 1953; Forcart, *Proc. mal. Soc. Lond.* 35, p. 104, pl. 11, 1963; Van Bruggen, *Ann. Natal Mus.* 18, p. 390, 1966; Forcart, *Ann. Natal Mus.* 18, p. 512, 1967.  
*Veronicella saxicola* Cockerell, *Conchologist* 2, p. 194, 216, 1893 (type locality: Port Elizabeth, Cape Province); Connolly, *Ann. S. Afr. Mus.* 33, p. 450, 1939.  
*Laevicaulis saxicolus*; Forcart, *Ann. Mus. R. Congo Belg. (8°) Zool.* 23, p. 89, 1953; Forcart, *Proc. mal. Soc. Lond.* 35, p. 105, 1963.

- K.N.P.: Skukuza Rest Camp, S 7  
 Manung Koppie, S 35  
 Godleni, S 74  
 Beacon A, Lebombo Range, S 107  
 Pumbe, C 52  
 Satara Rest Camp, C 71  
 Shibotwane, C 72  
 Satara road W. of turn-off, C 84  
 Sweni firebreak, C 91  
 Nwamuriwa Hill, C 136  
 Saliji Road, rocky koppie, C 165  
 Pafuri, near border, N 5  
 Near Malonga Spring, N 28  
 Shingwedzi Rest Camp, N 119  
 N. of Shingwedzi R., N 119  
 S. of Shingwedzi R., N 119



Figs. 1-2. Distribution in the Kruger National Park of 1. *Laevicaulis n. natalensis* (Krss.) (dots) and *L. alte* (Fér.) (stars), cross hatching indicates the area with a mean annual rainfall of 30-35 inches; 2. *Curvella amicitiae* n. sp. (type locality indicated by arrow).

It appears that *Laevicaulis n. natalensis* occurs throughout the Kruger National Park (see also Van Bruggen, 1966: 390). Usually only a few specimens are found. On 21st February, 1964, however, 15 specimens were collected within a short time at Nwamuriwa Hill; heavy and soaking rains had fallen the day before. The subspecies occurs over a wide area in Southern Africa from Rhodesia and Mozambique to the southeastern Cape Province, reaching its eastern limits at about 25° longitude east.

*Laevicaulis alte* (Férussac, 1821), fig. 1.

*Vaginulus alte* Férussac, *Tabl. Syst. Limaces* p. 14, 1821 (type locality: Pondicherry, India).  
*Laevicaulis alte*; Forcart, *Ann. Mus. R. Congo Belg.* (8°) *Zool.* 23, p. 63, pl. 2, figs. 4a-b, pl. 4, figs. 7a-d, map 6, 1953; Van Bruggen, *Ann. Natal Mus.* 18, p. 390, 1966; Forcart, *Ann. Natal Mus.* 18, p. 514, 1967.  
*Vaginulus petersi* von Martens, *Monatsber. Akad. Wiss. Berlin*, p. 736, 1879 (type locality: Inhambane, Mozambique).  
*Veronicella petersi*; Connolly, *Trans. R. Soc. S. Afr.* 12, p. 187, 1925; Connolly, *Ann. S. Afr. Mus.* 33, p. 450, 1939.  
*Vaginula maura* Germain nec Heynemann; Germain, *Mem. Est. Mus. zool. Univ. Coimbra* (1) 80, p. 47, figs. 8-9, 1935.

K.N.P.: Dimbu W. of Punda Milia, N 30

Shipudze Ridge, N 38

*Laevicaulis alte* is widely spread in central Africa; in Southern Africa it occurs west of 29° longitude east as far south as Port St. Johns. Elsewhere in the extra-African tropics it has become established in the wake of Man. The species appears to be new for both the Transvaal and South Africa. The distribution in the Kruger National Park (fig. 1, stars) appears to indicate that *L. alte* is less drought resistant than *L. n. natalensis*; both localities are inside the small northwestern area that has a mean annual rainfall of 30-35 inches. This is entirely in accordance with the Southern African localities enumerated by Forcart (1967). *L. n. natalensis* is on the whole much commoner and more widely distributed, indicating a much wider ecological tolerance (found in areas with mean annual rainfall of 15-20 inches!) than is displayed by its congener. It would be interesting to investigate the ecology of both species where they occur together (Mt. Selinda in Rhodesia, Charter's Creek in Zululand, and Pietermaritzburg in Natal). *L. alte* is obviously an adaptable species as witnessed by its secondary distribution outside the Ethiopian Region.

Family ENIDAE

*Conulinus metuloides* (Smith, 1899)

*Conulinus metuloides*; Van Bruggen, *Ann. Natal Mus.* 18, p. 333, fig. 16, 1966.

A shell from near the baobab forest off the Nyala Drive, block N 4, has long defied identification. Comparison at the British Museum (Natural History), London, has now led to it being considered to belong to *Conulinus metuloides*. Material from the Victoria Falls seen by the present author in the British Museum is "extremely slightly more obese" than the type, "though quite inseparable" (Connolly, 1939: 434). Material from Broken Hill, Zambia (also in the British Museum), is close to that from the Victoria Falls. The K.N.P. specimen comes closest to the Victoria Falls and Broken Hill shells and there is no reason to identify it with other species. For the present it seems advisable to label it *Conulinus*

*metuloides* var. The new record naturally fits into the distribution pattern in the K.N.P. (see fig. 16 in Van Bruggen, *op. cit.*)

### Family LIMACIDAE

#### *Limax (Lehmannia) valentianus* Férussac, 1823

*Limax valentianus* Férussac, Férussac & Deshayes, *Hist. nat. gén. partic. Moll. terr. fluv.* 2, p. 96E, Atlas pl. VIII A, figs. 5, 6, 1823 (type locality: Valencia, Spain); Waldén, *Ark. Zool.* (2) 15, p. 71 sqq., figs. 1-19, pl. 1, 1962; Van Bruggen, *Beaufortia* 11, p. 162, 1964; Van Regteren Altena, *Zool. Mededel. Leiden* 41, p. 292, 1966.

K.N.P.: Skukuza Rest Camp, S7

One specimen of the slug *Limax valentianus* was found by the Biologist K.N.P. under stones at Skukuza on 3rd November, 1962. This is the second anthropochorous mollusc in the K.N.P. The species is autochthonous in southern Europe; further particulars are to be found in Van Regteren Altena (1966), which author has kindly identified the present specimen. It was collected together with seven specimens of another alien slug, *Deroceras laeve* (Müll.). The species is new to the K.N.P. and the Transvaal.

### Family UROCYCLIDAE

#### *Trochonanina mozambicensis* (Pfeiffer, 1855)

*Trochonanina mozambicensis*; Van Bruggen, *Ann. Natal Mus.* 18, p. 346, figs. 29, 31, 1966.

In the Rijksmuseum van Natuurlijke Historie, Leiden, a specimen of *Trochonanina mozambicensis* was found among *Melanoides tuberculatus* (Müll.) from the Letaba River, leg. H. Lang, 1938, don. W. J. Clench. Apart from the fact that it represents early K.N.P. material, it is also interesting as a new locality record. Even if the specimen was washed down the river, it still fills up one of the gaps in the distribution in the game reserve (Van Bruggen, *op. cit.*, fig. 29).

Kruger National Park material of the species was compared with the types in the British Museum (Natural History); these consist of a juvenile and a half-grown shell, labelled "Tette", "Mr. Peters" (no numbers). The shells were found to agree well and it was confirmed that all K.N.P. material indeed belongs to *T. mozambicensis*.

#### *Urocyclus (Elisolimax) flavescens* (Keferstein, 1886), fig. 5.

*Parmarion flavescens* Keferstein, *Malak. Blätt.* 13, p. 70, pl. 2, figs. 1-8, 1866 (type locality: Inhambane, Mozambique).

*Urocyclus flavescens*; Connolly, *Trans. R. Soc. S. Afr.* 12, p. 138, 1925; Connolly, *Ann. S. Afr. Mus.* 33, p. 166, pl. XVI, figs. 11-12, 1939; Forcart, *Proc. mal. Soc. Lond.* 35, p. 107, 1963; Forcart, *Ann. Natal Mus.* 18, p. 542, figs. 25-31, 1967.

*Elisolimax flavescens*; Van Bruggen, *Ann. Natal Mus.* 18, p. 390, 1966.

*Aspidoporus fasciatus* von Martens, *Monatsber. Akad. Wiss. Berlin* p. 736, 1879 (type locality: Rio Quelimane, Mozambique).

*Urocyclus fasciatus*; Connolly, *Trans. R. Soc. S. Afr.* 12, p. 138, 1925; Connolly, *Ann. S. Afr. Mus.* 33, p. 167, 1939; Forcart, *Proc. mal. Soc. Lond.* 35, p. 107, 1963.

*Urocyclus pallescens* Cockerell, *Ann. Mag. nat. Hist.* (6) 7, p. 101, 1891 (type locality: Durban, Natal); Connolly, *Ann. S. Afr. Mus.* 33, p. 167, 1939; Forcart, *Proc. mal. Soc. Lond.* 35, p. 107, 1963.

K.N.P.: Skukuza Rest Camp, S 7

Near Lower Sabi Camp, S 33

Foot of Macili Kop, S 101

*Urocyclus flavescens* is widely distributed in southeastern Africa from Quelimane in Mozambique to as far south as Durban in Natal. The species is new to the Transvaal. It appears to be uncommon in the Kruger National Park and has so far been found to occur only in the area south of the Sabi River; this part of the game reserve has a mean annual rainfall in excess of 20 inches and in parts of up to 35 inches (block S 101). Very probably the species cannot live in the drier parts of the national park; a look at the localities listed by Forcart (1967: 545) shows immediately that *Urocyclus flavescens* is restricted to those parts of Southern Africa that enjoy a comparatively high rainfall. So far, the author has only collected this slug after rains or in humid surroundings such as forest, bush, etc.

Family SUBULINIDAE

*Curvella amicitiae* n.sp., figs. 2-3

A medium-sized, slender species of *Curvella* with well-marked sculpture consisting of curved costulae or striae.

Shell (fig. 3) small, slender, turritiform or subulate, major diameter at apex of aperture, rimate or with completely closed umbilicus, uniformly broken white, semi-transparent, sides practically straight, apex mamillate. Whorls  $6\frac{1}{2}$ -7, regularly increasing, rather flat, smoothly rounded at periphery in both juvenile and adult shells. Whorls sculptured with numerous well-marked, close, regular, curved, flattish costulae or striae, about as far apart as wide, giving the shell a softly shining silky appearance; first  $1\frac{1}{2}$  whorls smooth, very slightly granulate, after which the costulae, at first rather faint, gradually become more prominent. Suture well-defined, somewhat impressed and slightly filiform. Aperture subovate, labrum sharp, arched forward in profile, retracted at each extremity, columella straight, blending evenly into basal margin of shell, margin of columella narrowly reflected over narrow or closed umbilicus.

Animal yellowish.

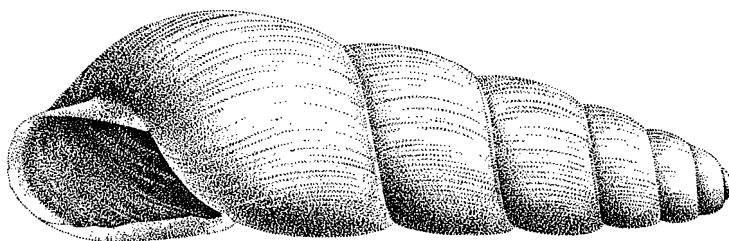


Fig. 3. *Curvella amicitiae* n. sp., Mahulule Koppies, holotype shell, actual length 9.8 mm. H. Heijn del.

Measurements holotype shell (fig. 3):  
length shell 9.8 mm.  
major diameter 3.1 mm., l/d 3.16  
aperture length 3.0 mm.  
aperture width 1.6 mm.  
length last whorl 4.9 mm., 7 whorls.

Seven more specimens from the same population have been measured as tabulated below:

|            |                  |                                 |
|------------|------------------|---------------------------------|
| paratype 1 | 8.9 x 3.2 mm., 1 | d 2.78, 6 $\frac{3}{4}$ whorls, |
| paratype 2 | 8.9 x 3.1 mm., 1 | d 2.87, 6 $\frac{1}{2}$ whorls, |
| paratype 3 | 8.7 x 3.1 mm., 1 | d 2.81, 6 $\frac{3}{4}$ whorls, |
| paratype 4 | 8.5 x 3.2 mm., 1 | d 2.66, 6 $\frac{1}{4}$ whorls, |
| paratype 5 | 8.1 x 2.8 mm., 1 | d 2.89, 6 $\frac{1}{4}$ whorls, |
| paratype 6 | 8.0 x 2.9 mm., 1 | d 2.76, 6 $\frac{1}{4}$ whorls, |
| paratype 7 | 7.7 x 2.9 mm., 1 | d 2.65, 6 $\frac{1}{4}$ whorls. |

Distribution. Type locality: South Africa, Transvaal, Kruger National Park, Mahulule Koppies, block N 273, 23rd February, 1964, leg. A. C. van Bruggen c.s. (holotype, paratypes 1-7, unnumbered paratypes).

Other material: Kruger National Park, Shabin Koppie, block S 35, 27th April, 1962 (juvenile paratype); K.N.P., along main road just south of Olifants River, block C24, 28th February, 1964 (paratype); K.N.P., near Phugwane River, block N 103, 25th February, 1964 (juvenile paratype); K.N.P., south of Shingwedzi River, block N 119, 2nd May 1962 (two juvenile paratypes in alcohol); K.N.P., west of Letaba Rest Camp, block N 246, 23rd February, 1964 (juvenile paratype); K.N.P., south of Manyukelani, block N 278, 23rd February, 1964 (juvenile paratype). All leg. A. C. van Bruggen c.s. All K.N.P. localities are shown in fig. 2.

South Africa, Zululand, Mkuzi Game Reserve, Mhlala Bush, 5-7 January, 1964, leg. A. C. & W. H. van Bruggen (paratype in alcohol).

Rhodesia, Matopos National Park, 2 miles east of Maleme Rest Camp, approximately 4,000 ft., 15th February, 1965, leg. A. C. & W. H. van Bruggen (3 paratypes).

The material has been divided as follows: Natal Museum, Pietermaritzburg (paratypes 1 and 5, unnumbered paratypes from K.N.P. blocks C 24, N 119, N 273, N 278, paratypes from Zululand and Rhodesia), K.N.P. collection, Skukuza, Transvaal (paratypes 2 and 6, unnumbered paratypes from K.N.P. blocks S 35, N 103, N 246, N 273), British Museum (Natural History), London (paratypes 3 and 7), Rijksmuseum van Natuurlijke Historie, Leiden (holotype, paratype 4, unnumbered paratype from K.N.P. block N 273).

The animal has not been dissected because of the condition of the alcohol material consisting of only two juveniles and one poorly stretched adult.

As shown by the measurements of the shells of the population from the type locality the species is subject to a good deal of variation, which is indeed confirmed by the measurement of two other adult shells: 8.1 x 3.2 mm., 1 d 2.53, 6 whorls (K.N.P., block C 24) and 8.7 x 2.9 mm., 1 d 3.00, 6  $\frac{3}{4}$  whorls (Matopos National Park). The upper third of the shell of the Rhodesian specimens is slightly more constricted than that of the other shells; this may have been caused by isolation at a higher altitude than the other specimens, which were found at localities from under 1,600 ft. However, the combination of characters, viz., turritiform or subulate shape with comparatively high 1 d, size and sculpture, is sufficiently diagnostic not to confuse it with other species. A careful scrutiny of all species described from Southern Africa failed to disclose any sufficiently similar species. Dr. B. Verdcourt has been kind enough to thoroughly examine various specimens, concluding that no such species is as

yet known from East Africa. *Curvella amicitiae* appears to be closest to the central African species *C. whytei* Smith (Smith, 1899: 588, pl. XXXIII, fig. 45), described from Mount Chiradzulu and the Zomba Plateau at 5,000 ft. in Malawi (Nyasaland). The types of this species, collected by A. Whyte and communicated by Sir H. H. Johnston, were studied in the British Museum (Natural History) by courtesy of Mr. N. Tebble; a total of 14 shells (Cat. nos. 96.12.31.159-164, Mt. Chiradzulu, among which the type; cat. nos. 96.12.31.165-170, 8 shells, Zomba Plateau) shows that *C. whytei* reaches a greater size, is comparatively wider, has its major diameter somewhat lower down and has a finer apex than the new species under discussion. *C. whytei* is subject to the same kind of variation as the latter.

The pattern of distribution of *C. amicitiae*, encompassing the lowlands of Zululand, the Transvaal Low Veld, the Rhodesian Plateau and probably much of the interlying country, is quite a common one, found in many groups of animals and plants.

*C. amicitiae* is collectively dedicated in friendship and gratitude to the staff of the Kruger National Park and the Mollusca Section of the British Museum (*amicitia*, Lat. = friendship).

#### Family ACHATINIDAE

##### *Achatina (Lissachatina) immaculata* Lamarck, 1822.

*Achatina immaculata*; Van Bruggen, *Ann. Natal Mus.* 18, p. 371, figs. 51-53, 1966; Van Bruggen, *Zool. Verh. Leiden* 91, p. 19, pl. 1, 1967.

In the Zoölogisch Museum, Amsterdam, three shells of *Achatina immaculata* from the Kruger National Park were found, bearing the label "nabij de Zandrivier" (near the Sand River); the specimens were collected by N. P. van den Berg in 1933. The locality is obviously somewhere in blocks C 154 and 155, where the road crosses the Sand River: *A. immaculata* is already known to occur in the area. These specimens were among the first land molluscs to be collected in the K.N.P.; the material could be examined by courtesy of Mr. H. E. Coomans, Curator of Molluscs at the Zoölogisch Museum.

##### *Archachatina (Tholachatina) livingstonei* (Melvill & Ponsonby, 1897), fig. 4

*Achatina livingstonei* Melvill & Ponsonby, *Ann. Mag. nat. Hist.* (6) 19, p. 636, pl. 17, fig. 6, 1897 (type locality: Kuruman, Cape Province); Connolly, *Ann. S. Afr. Mus.* 33, p. 305, 1939.

*Archachatina (Tholachatina) livingstonei*; Bequaert, *Bull. Mus. comp. Zool. Harvard* 105, p. 201, 1950.

K.N.P.: Nwanetsi Dam, C 85.

On 5th December, 1962, the staff of the Biologist collected alive a small achatinid with a narrow flammate shell, which measures 51.0 x 21.7 mm, 1/d 2.35, 8 whorls. Its identification had to be left in abeyance because it did not match any named specimen among the extensive series of Southern African Achatinidae in the collections of the Natal Museum. In 1967 the problem was tackled anew at the British Museum (Natural History), London; it was compared with the holotype and paratype of *Achatina livingstonei* M. & P. (Kuruman, D. Livingstone, 1912.8.16.192-3) and four other shells belonging to the same species (Campbell, Griqualand West, G. H. Williams, 1937.12.30. 1807-9; Prieska Dist., Gould [recte Goold], 1937.12.30.1810). The main differences are size (K.N.P. specimen larger than largest shell available, viz., 43.8x19.5 mm, 1/d 2.25, 7 whorls, Campbell, C.P.), apex



(more slender in K.N.P. shell than in any other specimen) and sculpture (in K.N.P. specimen much more pronounced, almost absent in other fresh shells). Moreover, the species appears to occur in the dry Cape districts adjoining the western borders of the Orange Free State. However, a larger shell and more prominent sculpture may be merely products of a life under less marginal conditions, such as a somewhat higher rainfall. Also a distribution pattern encompassing both the Kruger National Park and Griqualand West is not as unusual as it at first sight may seem to be. The species may yet be found in the poorly known interlying area or the present specimen may represent a relict population dating back to the days of a drier period when the species occupied a continuous range. A careful consideration of all available data has convinced the author that the K.N.P. specimen indeed belongs to *Archachatina livingstonei*, of which it may represent an as yet insufficiently characterized subspecies.

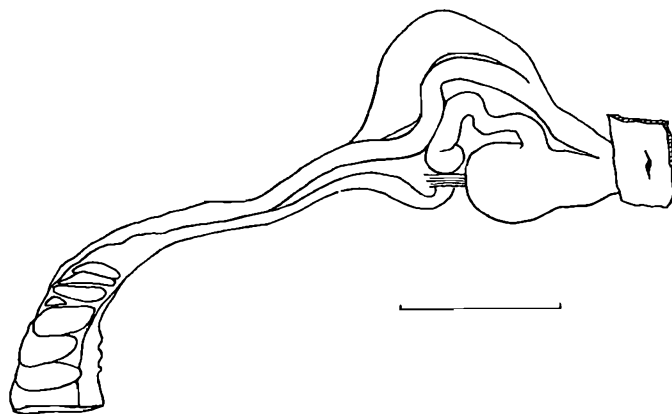


Fig. 4. *Archachatina livingstonei* (M. & P.), near Nwanetsi Dam, basal genitalia, scale 5mm.

Unfortunately the animal was poorly relaxed and could not be properly loosened from its shell; therefore only the basal genital structures could be studied. The genitalia (fig. 4) are somewhat compact. The comparatively large, bulbous penis is completely enclosed in the penis sheath; the penial retractor muscle is attached to the right tentacular retractor muscle. The thick and coiled vas deferens enters the penis laterally somewhere halfway the apex; the vagina is only slightly thicker than the vas deferens. The almost ductless spermatheca is quite large and more or less club-shaped with a pointed apex.

A scrutiny of the literature, mainly of Mead (1950), shows that the combination of bulbous, fully ensheathed penis, vas deferens entering the penial sheath halfway from the apex, and lowly inserted, club-shaped and almost ductless spermatheca, appears to be unique in the family. Among the species of *Archachatina* the shell of *A. livingstonei* also seems to occupy a somewhat isolated position, as witnessed e.g., by Connolly's remark (Connolly, 1939: 305): "A distinct little species, to which its regular contour imparts a more finished appearance than that of most South African forms." An added difficulty is that seemingly related species have as yet not been dissected, which for the moment makes anatomical discussions somewhat futile.

*Archachatina (Tholachatina) transvaalensis* (Smith, 1878)

*Achatina transvaalensis* Smith, *Quart. J. Conch.* 1, p. 351, 1878 (type locality: "Eastern slope of the Drakensberg Mountains at Lydenburg Gold Fields", Transvaal).

*Achatina subcylindrica* Preston, *Ann. Mag. nat. Hist.* (8) 3, p. 182, pl. 7, fig. 8, 1909 (type locality: "Natal").

*Achatina subcylindrica* Prest. appears to be a synonym of *A. transvaalensis* Smith (complete synonymy in Van Bruggen, 1967), so that the latter name should be added to the list, deleting the former. *Archachatina transvaalensis* is thus a new species for the K.N.P.

## Family APERIDAE

*Apera bruggeni* Forcart, 1967, fig. 5

*Apera bruggeni* Forcart, *Ann. Natal Mus.* 18, p. 518, figs. 14-15, 1967 (type locality: Kruger National Park, Olifantspoort area, block C 3).

K.N.P.: Olifantspoort area, C 3

The single specimen obtained "was found devouring a *Sphaerotherium* spec. (Diplopoda)." (Forcart, 1967: 520).

*Apera watsoni* Forcart, 1967, fig. 5

*Apera watsoni* Forcart, *Ann. Natal Mus.* 18, p. 520, figs. 16-17, 1967 (type locality: Kruger National Park, Sabi River area, block C 162).

K.N.P.: Sabi R. area, C 162

The discovery of two new species of *Apera* in the Kruger National Park is undoubtedly the most important result of the terrestrial mollusc survey of the game reserve. The zoogeographical implications have already been touched upon by Van Bruggen (1966) and Forcart (1967: 529-530). Our knowledge of the distribution of the genus *Apera* is now as follows. A total of twelve species has become known; these can be divided into three groups. The species occur from Table Mountain, Cape Town, in the south to as far north as Mount Vumba near Umtali; all known localities are situated on or east of the Drakensberg escarpment in a comparatively narrow stretch along the east coast. This is the part of Southern Africa which enjoys the highest mean annual rainfall; in general *Apera* slugs appear to be forest dwellers, adapted to a variety of forest from tropical rain forest (e.g., in Rhodesia) to fairly dry gallery forest (e.g., along the rivers in the Kruger National Park). Natal appears to be the headquarters of the genus; six species, belonging to all three groups, are distributed throughout the province, usually occurring as far south as Port St. Johns in the adjoining part of the Cape Province. The most primitive group occurs with four species from Cape Town to the Kruger National Park (greatest distance between localities approximately 1,100 miles); the second is distributed with five species from Grahamstown to Mount Vumba (approximately 1,100 miles) and the third, most advanced, group with three species from Somerset East to Barberton (approximately 600 miles).

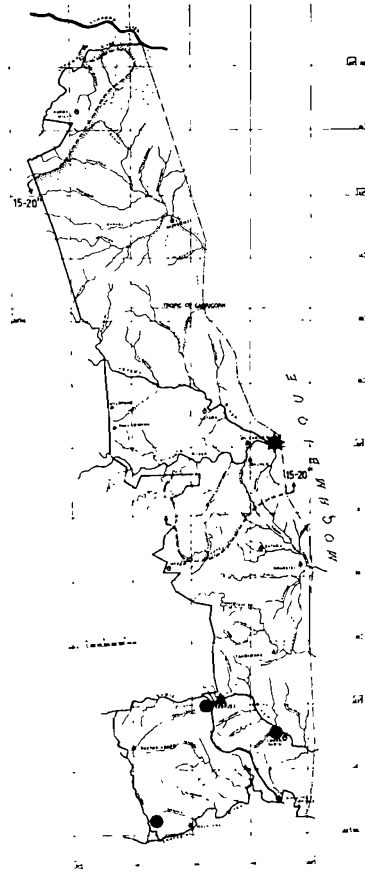


Fig. 5. Distribution in the Kruger National Park of *Urocyclus flavescens* (Keferst.) (dots), *Apera bruggeni* Forc. (star) and *A. watsoni* Forc. (triangle). The limits of the area with a mean annual rainfall of 15-20 inches have been indicated.

### Family STREPTAXIDAE

#### *Streptostele (Raffraya) herma* Connolly, 1912

*Streptostele herma* Connolly, *Ann. S. Afr. Mus.* 11, p. 98, pl. 2, fig. 3, 1912 (type locality: Victoria Falls, Rhodesia, which has to be restricted to the south bank of the Zambezi R.); Connolly, *Ann. S. Afr. Mus.* 33, p. 17, 1939; Van Bruggen, *Zool. Verh. Leiden* 91, p. 30, fig. 14, 1967.

*Streptostele meridionalis* Van Bruggen, *Ann. Natal Mus.* 18, p. 380, figs. 58, 60, 63, 1966 (type locality "Kruger National Park, between Semane Koppie and Ngirivane Windmill, block C 69", Transvaal).

*Streptostele meridionalis* vBr. appears to be a synonym of *S. herma* Conn. (Van Bruggen, 1967) so that the latter name should be added to the list, deleting the former, *S. herma* is thus a new species for the K.N.P.

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